DOCUMENT RESUME

ED 421 026 HE 031 302

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TITLE Quality Education: Does Class Size Matter?
INSTITUTION Canadian Society for the Study of Higher Education.
PUB DATE 1995-00-00
NOTE 7p.
AVAILABLE FROM Canadian Society for the Study of Higher Education, 320-350 rue Albert St., Ottawa, Ontario K1R 1B1, Canada; phone: 613-563-1236; fax: 613-563-7739.
PUB TYPE Collected Works - Serials (022)
JOURNAL CIT CSSHE Professional File; n14 Win 1995
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Class Size; College Faculty; *College Instruction; Competence; *Course Organization; Educational Quality; Foreign Countries; Higher Education; *Instructional Effectiveness; Outcomes of Education; Teacher Effectiveness; *Teacher Student Relationship; Teaching Methods

ABSTRACT

This paper reviews the research on the effects of class size on educational quality in higher education, and discusses the characteristics of the students and kinds of course organization that facilitate effective large-class teaching. It notes that while early research found that class size mattered, newer studies have shown that factors other than class size are more important to educational quality. Studies of teaching effectiveness have found that course organization and instructor practices are more important than class size in producing positive student outcomes. The paper states that instructor competency, concern for students, energy level, speaking ability, organization, and clarity are the factors that help students learn in large classes. It also argues that student involvement and personal contact between the professor and the students make a significant difference in learning outcomes, and that this can be encouraged through brainstorming sessions, asking questions and encouraging dialogue, dividing the class into smaller task-oriented groups, facilitating problem solving and critical thinking skills by starting class with a puzzle or problem, and class debates, simulations, and role playing. (Contains 18 references.) (MDM)

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ED 421 026

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CSSHE Professional File

Number 14, Winter 1995

Quality Education: Does Class Size Matter?[1]

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Abstract

Small classes are not necessarily better. In fact, what goes on in the classroom matters more than the size of the class. Early research found that class size had no impact on student grades and only minimal effects on students' higher order reasoning, motivation and course evaluations. Later studies have found that the characteristics of students and their instructors, along with course organization and management characteristics, are more important than class size in making sure students learn. Many senior students actually prefer large classes and teaching evaluations improve after class size reaches 250. Instructor effectiveness has been found to be as good or better in the best large classes as in the best small classes. Consequently, researchers have changed their focus from "does class size matter?" to what are the dimensions of effective teaching in large classes?" In this article, instructor characteristics that facilitate effective large class teaching and course organization aspects that produce positive outcomes are described.

Sommaire

Les petites classes ne sont pas nécessairement meilleures que les grandes. Plutôt que la taille, c'est ce qui s'y passe qui compte. Les premières recherches ont démontré que la taille de l'effectif n'avait pas d'effet sur les notes des étudiants et seulement des effets minimes leur processus de raisonnement, leur motivation et leur évaluation des cours. Des études ultérieures ont révélé que la qualité des étudiants et de leur professeurs au même titre que l'organisation des cours et la gestion de l'ensemble a plus d'importance que la taille des classes dans la valeur de l'apprentissage. Parmi les étudiants avancés, la plupart préfèrent les classes nombreuses et l'évaluation de l'enseignement s'améliore lorsque l'effectif atteint 250 étudiants. L'efficacité des enseignants s'est avérée aussi grande ou même plus grande dans les meilleures des grandes classes que dans les meilleures des petites classes. Par conséquent, les chercheurs ne demandent plus "la taille de la classe a-t-elle de l'importance?" mais plutôt "comment l'enseignement peut-il être productif dans une grande classe?" L'auteur liste certains caractéristiques des enseignants qui rendent productif l'enseignement aux grandes classes et décrit les aspects de l'organisation des cours qui donnent des résultats positifs.

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The phrase *high quality undergraduate education* evokes a common image --a knowledgeable, demanding, stimulating and caring instructor engaging a small group of students in the active, involved, animated pursuit of knowledge and wisdom. The small, intimate, participatory nature of the interaction and the more personal evaluation of student performance through essays is generally expected to provide a better quality of education than large impersonal lectures.

But does class size really make a difference to the quality of education? How is quality education measured? What is the effect of class size on educational outcomes and student learning? If there are relationships between class size and student outcomes, how strong are they? What impact is suggested by the empirical research in this area? If the anticipated relationships do not exist or are weak, why is this the case? Are there other factors which produce positive learning outcomes?

The belief that small classes are better is widely held today. The amount and intensity of faculty-student contact, it is often assumed, results in more learning, particularly higher order and complex reasoning. Large classes, on the other hand, often involve lectures, little interaction, and multiple choice examinations, and so, it is often felt, less learning.

These expectations concerning the positive consequences of small classes are contained, explicitly or implicitly, in our professional literature as well as in more popular communications. Some Canadian universities and departments consider small classes to be essential to good student learning. Consequently, policy guidelines that limit class size have been developed. Class sizes are also used as an important indicator of an institution's commitment to undergraduate education or of the value system and priorities of the institution and the nature of the experience students will have. In order to satisfy public accountability and disclosure concerns, universities are often urged to develop performance indicators related to their teaching function. Student/ teacher ratios and class sizes have been suggested as indicators of instructional load or resources, with the student/teacher ratio considered as an output measure. In literature about indicators, small class sizes generally are treated as signifying a better learning experience for students, and hence, a better quality of education. In the first *Maclean's* magazine ranking of universities, one university president is cited as saying that smaller undergraduate classes will improve the quality of teaching.

Early Research Found Size Mattered

Early research literature on class size did, in fact, seem to show a link between small classes and improved learning. Although the literature suggests that class size *per se* has little or no impact on the acquisition of substantive knowledge or academic skills, smaller classes appeared at first to be somewhat more effective than larger ones in motivating students, producing attitudinal changes and enhancing higher order thinking and reasoning.

Much of the class size research uses final course grades, standardized test scores or course evaluation data as the outcome measures. As early as 1924, researchers compared the performance of students in a 100+ class with a 40+ class in the same course. Students in the small class did slightly better on an essay and mid-term test while students in the large class did slightly better on quizzes and the final examination. A number of other studies, however, have found that class size has little effect on common examination results, especially when compared to instructor enthusiasm, organization and clarity.

In the initial research, when measures other than the standard academic achievement measures were used, class size appeared to have some impact. Smaller classes were found to produce statistically significant differences in problem solving, student attitudes to teaching and knowledge retention. But while significant, the differences were small. Thus, the impact of class size, it was suggested, depended in part upon the educational goal. If the acquisition of factual knowledge was the primary objective, then size was not of great consequence. If higher level thinking, application, motivation and attitudinal change were primary, then smaller classes were best. "Moreover, in almost all studies, students and faculty members tended to prefer small classes" (McKeachie, 1980).

New Studies Show Other Factors More Important

However, more recent studies indicate that student attitudes toward large classes are influenced more by course content, organization and instructor ability than by size. Even negative attitudes toward a large class can be altered if the method of presentation varies from one class to the next and if instructional and student objectives are established. Moreover, the preference for small classes is,

in fact, not an uncontested finding. Some students actually prefer large classes and teaching evaluations are found to be negatively related to class size only if the instructor is inexperienced. "One could conclude that the experienced, full-time faculty are able to adapt their teaching such that class size has no independent impact on the favorability of their ratings" (Hamilton, 1980).

An examination of the relationship between class size and overall student evaluations for more than 4000 courses at 16 campuses in the United States has produced interesting results. The researchers found that student evaluations became less favorable as class sizes approached 250 and then became more favorable for even larger classes. In other words, under certain circumstances the quality of education as indicated by students themselves may be superior in very large courses (Wood, Linsky & Straus, 1974).

One example of a background variable that seems to influence class size effect is 'year in university'. Researchers find that first-year college students prefer small classes and upper division students prefer large classes. They conclude that experience in larger classes results in stronger preference for large classes (Feigenbaum & Friend, 1992).

Course and Instructor Characteristics Count

Studies of teaching effectiveness have found that course organization and instructor practices are more important than class size in producing positive student outcomes. Students indicate greater learning and greater enjoyment in courses in which instructors examine for higher-order thinking and reasoning. There is also a growing body of research literature which suggests that higher level reasoning can be developed in large classes. Some instructors go beyond information dissemination to target thinking and communication skills as the desired educational outcomes. By dividing large classes into small study or working units, problem solving and communication skills are developed. Since these are large classes but are organized in a different manner from the usual lecture or lecture-with-discussion format, it is more important to look at exactly what is done in classes than to focus on the size of the class alone.

Teaching can be improved, even in large classes. Improving the quality of the instructional materials, helping students acquire the thinking skills needed to master the content, testing to provide corrective feedback instead of just for grade assignment, and increasing quality reinforcement and student participation were found to result in very high student performance.

Good teachers encourage contacts with students, stress active learning, have students reflect on their learning and try to relate it to their daily lives, provide prompt feedback on performance and respect diverse talents and ways of learning. With the exception of personal and high quality faculty-student interaction which is difficult in large classes, the other characteristics and practices are attainable in large classes.

Students indicate some positive features of large classes which can be further enhanced and some negative features which may be minimized with the right organization and management. The positive aspects are the presence of other students, low pressure, sense of independence and the anonymity of attendance. Longitudinal research has, in fact, found that not only is student-faculty interaction important for producing positive learning outcomes but that student-student contact may have been underemphasized as a major source of student growth and development. The independence fostered by large classes may help produce the independent, self-directed, lifelong learners everyone seeks.

Instructor competency, concern for students, energy level, speaking ability, organization and clarity are what assist students in learning in large classes. In large classes students prefer experienced, qualified or very knowledgeable instructors. This finding is similar to one mentioned previously, namely that the negative effects of class size emerge especially in the case of inexperienced instructors. The experienced instructors may adapt their delivery and course organization to the larger numbers, thereby removing the impact of size by itself. Who tends to get assigned the large survey courses and why is there a movement to get senior faculty into introductory teaching? Experience counts, especially in organizing, conducting and evaluating a large class.

Students also indicate that learning is facilitated when professors are interested in students and care about their progress. Instructors who are enthusiastic, dynamic, speak well, maintain attention and hold interest are regarded by students as effective. "Comparisons of large classes with small classes suggested, then, that students perceived the instructors' effectiveness in teaching the subject matter, organization and clarity and use of examples and illustrations to be of significantly higher quality in the best large classes. Instructors' interest in student learning and

instructor/student interaction, however, were rated of significantly higher quality in the best small classes" (Wulff, Nyquist & Abbott, 1987).

Involvement and Personal Contact Make a Difference

Although more difficult than in a small class, it is possible to have meaningful contact with students in a large class. There is emerging evidence that student involvement, faculty-student contact and personal rapport do occur in some large classes. Being personal, preventing students from feeling insignificant and anonymous, and staying in touch with TAs are all key aspects of effective large class instruction. "Even a large class can be personal . . . Remaining in the lecture hall for a few minutes after class can do a lot to convince students that you are interested in them. One problem students have with large-class lectures is that they are anonymous. By remaining after class you can answer a few questions and show that you are accessible. You may also get a sense of what may have gone wrong with the lecture" (Aronson, 1987).

Students may tend to feel insignificant and anonymous in large classes, but there are ways to counteract that. One instructor reports using a cordless microphone that allows him to lecture while wandering around the classroom.

The didactic lecture is the most common method of university instruction but it is not necessarily the best. In large classes, it is possible to incorporate the personal contact and the student involvement which are assumed to exist in small classes, and are of great benefit in delivering quality education. Independent of class size, active participation facilitates learning better than passive listening, and meaningful learning is more effective than rote memorization. Instruction which is intimate, interactive and investigative produces the most positive educational outcomes. The importance of interaction, participation and involvement for student learning are widely recognized in general and are, in fact, a part of effective large class instruction. Lectures need not be sermons, they can be interactive and participatory. The following suggestions can help active large class learning:

- brainstorming is one example of an interactive, participatory format. An open-ended question such as " What do we know about...?" creates an opportunity to maximize participation and to find out what students already know and do not know.

- asking questions of students and asking for questions from students encourages exchange and dialogue. The quality and substance of responses and queries indicates strengths and gaps in understanding.

- show of hands and short surveys provide variety and increase faculty-student and student-student interaction.

- dividing the class into smaller task oriented groups with a focused purpose, time-limit and reporting requirement promotes greater interaction and involvement.

- problem solving and critical thinking can be fostered by starting a class period with a puzzle, paradox or problem that begs for a solution, followed by a collective discussion of possible resolutions, and concluded by a more formal presentation by the instructor which contains elements suggested in the discussion phase. This also provides for segments and variety. Instructors can read, analyze and interpret a text and then ask students to do the same. "The process of participating together in the analysis of a common text is interactive, investigatory, and intimate" (Frederick, 1987).

- whole class debates, simulations and role playing have great potential for experiential learning and involve much energy and interaction.

In short, learning is not a spectator sport, and active, personal inquiry can and does occur in large classes. There are a number of other features which make for effective large class lecturing: having explicit course goals and student outcome expectations; planning, organizing and coordinating course content and procedures; motivating students and communicating enthusiasm; using a variety of strategies for teaching and learning, including visual and graphic aids; prompt feedback, *etc.*

In addition, large classes are not always lecture classes. The standard lecture format is only one way to organize a course. Since learning is really an active and interactive process, what learners do and how they connect with instructors is just as important as how instructors teach. It is possible to have students engage in a number of activities and tasks and to participate in a number of groups, with very little whole-class lecturing.

It is extremely important to get students involved in the active, collective, co-operative spirit of inquiry and investigation. This can be done in many ways, with very little lecturing.

As a group of 3M Teaching Fellows wrote in a recent open letter published in University Affairs (July 1994), "the emphasis . . . should be on communication, cooperative (especially group) learning, critical analysis or applied problem-solving, variety and relevance -- not merely on the absorption of facts or formulae." The 3M Fellows suggest that faculty try new approaches to teaching, especially ones that promote active, critical, cooperative, communicative learning. If we were faced with teaching a large group of students, say 100, to swim, play the piano, or ride a bicycle, would we lecture?

Teaching and Learning Implications

The early research found no effect of class size on student grades and weak effects upon higher order reasoning, motivation and course evaluations. Later studies found that student, instructor and course organization and management characteristics are more important than class size in producing effective and cognitive learning outcomes.

Over time, there has been less and less research and evidence to suggest a link between class size and quality of education. Faced with the reality of large classes, instructors may have adapted their teaching styles, course organization and practices and assessment procedures to yield positive outcomes even with larger enrolments. Or perhaps these dimensions were always the important ones but emerged only with better research designs, comparisons and controls.

The research clearly indicates that quality education occurs in certain circumstances and these conditions are not exclusive to small classes. In fact, size *per se* and what it necessitates appears to be a small component of quality education. Small class sizes are neither necessary nor sufficient to ensure high quality student learning, growth and development. What matters is not the size of the class but what goes on in the class.

Average class sizes are thus not reliable proxies for positive learning environments or quality education. It would be better to develop measures that relate what goes on in classes to student learning and outcomes. Such measures would represent meaningful indicators of quality education. Similarly, university managers and senior administrators should identify the structures, practices and procedures which maximize student learning and development and encourage the application of these best practices.

It is not enough to know that instructor enthusiasm, knowledge, clarity, concern for students and course goals, organization, meaningful involvement and contact, active learning, specific expectations and prompt feedback work in producing positive student outcomes. These characteristics need to be enhanced and practised to do any good. A value-added, student-centred demonstration of what works and what doesn't in creating a rich learning environment would go a long way to answering calls for accountability.

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